REMARKS

ON

Dr. BOERHAAVE'S

THEORY

OF THE

ATTRITION of the BLOOD

In the LUNGS.

BY

SAMUEL MUSGRAVE, M. A.

Of *Corpus-Christi-College*, OXFORD.

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THE celebrated Dr. BOERHAAVE in his *Inſtitutiones Medicæ*, lays it down as a fundamental Principle, that the Blood, in paſſing through the Lungs, undergoes a Degree of Attrition conſiderably greater than in any other Part of the Body. This Attrition, according to his Syſtem, eminently increaſes the Heat of the Blood, at the ſame Time that it unites the elementary Parts of it more intimately, and makes the whole Maſs more denſe and compact.

I am ſo far from aſſenting to this Theory, that I cannot but apprehend it is abundantly confuted by the Texture and Appearance of the Parts themſelves. Is it to be ſuppoſed, for Inſtance, that the right Ventricle of the Heart, which is thinner and apparently weaker than the left, can communicate a greater Impulſe to the Blood? This however is one of the firſt Requiſites in producing a greater Degree of Attrition. There is ſtill a more remarkable Difference between the Pulmonary Artery, and the Aorta; the one, being looſe and flaccid; the other, of ſo denſe and compact a Nature, as to reſemble, in ſome Meaſure, a Cartilage.

If we go on to examine the Texture of the Parts, through which theſe Circulations are reſpectively performed, and obſerve how tender and ſpungy the Lungs are, in Compariſon of the Muſcular Parts of the Body, we cannot avoid coming to the ſame Concluſion; unleſs we would ſuppoſe that Nature made the ſtronger Subſtance to reſiſt the weaker Impreſſion: which ſurely would be interpreting its Meaning very perverſely.

Neither is it material to ſay that the Blood may ſuffer conſiderable Attrition by the alternate Motion of the Lungs in Reſpiration; either when expanded by the Air, or compreſſed by the Thorax. For, Action and Reaction being equal, it makes no Difference in the Effect, whether the Lungs be every Moment preſſed upon the Blood, or the Stream of Blood forced againſt the Lungs. Should we therefore admit the Sum of the Attritions produced by theſe two Cauſes in the Lungs, to be greater than that which ſubſiſts in the correſponding Arteries of the Body, the ſame Objection would ſtill remain, in regard to the Structure of the Parts. It would ſtill be impoſſible to comprehend how the Author of Nature could proportion his Work ſo ill, as to make the Power of Reſiſtance greateſt, where the Impreſſion was leaſt: to give an unneceſſary Degree of Strength to one Syſtem of Arteries, or an inſufficient one to the other. The

The Difficulties that attend this Theory are not more extraordinary, than the Proofs, by which it is ſupported, are defective. In regard to the Velocity of the two Circulations, Dr. HALLER expreſſes himſelf thus: *Cum ſanguinis tantum per pulmones tranſeat in dato tempore, quantum per univerſum corpus humanum, ſequitur, ut ſanguis per pulmonem in eadem ratione fluat celeriùs, quâ ipſe pulmo minor eſt.* (*In* Boerhaav. *Prælection. Acad.* Vol. II. p. 169.) It is hard to ſay whether the Doctor is more unfortunate here in his Premiſſes, or his Concluſion. In the firſt Place, that equal Quantities of Blood paſs in equal Times through the Lungs, and through the larger Circuit of the Body, is aſſerted, as far as I can inform myſelf, without any manner of Foundation either in Reaſon or Experiment. And ſecondly, admitting it to be true, the Conſequence would be juſt the contrary of what the Doctor ſuppoſes; namely, that the Motion of the Blood through the Lungs muſt be ſlower, and in the very ſame Proportion too, that he aſſigns for its being quicker. In a late Edition of the Commentary on *Boerhaave's* Inſtitutions, I find the following Note, by which it appears that the Doctor begins to ſuſpect at leaſt, the Juſtneſs and Force of his Reaſoning: *Hæc omnia expedita ſunt. Unum ſupereſt an velociùs trajicitur per pulmones Sanguis? Videtur etiam*

lentiùs

lentiùs trajici, quia ſanguis per corpus trajectus viam multò majorem eodem tempore abſolvit,—& video hanc rationem fusè & ornatè proponi a Cl. Krugero in Phyſiologiâ Germanicè ſcriptâ. Vol. II. p. 230. Ed. Gotting. 1745.

It has indeed been obſerved by Dr. *Hales (Hæmaſtat.* p. 67.) that in the Lungs of a Frog, the Blood moves with greater Velocity than in any other Part of the Body. We are not however to make any general Inferences from this Phænomenon, which ſeems to depend upon the peculiar Structure of the Frog and ſome other ſmall Animals, the Heart of which, having only one Ventricle, muſt of Neceſſity give the ſame Impulſe to all the circulating Blood. We cannot, I ſay, conclude from Inſtances of this Kind, that the relative Velocity of the two Circulations is exactly the ſame in larger Animals, where the Heart, having two Ventricles, may poſſibly impel the Blood with different Degrees of Force.

But to conſider this Experiment in another Light. It appears that the Power exerted at the Origin of the pulmonary Artery and the Aorta being equal, the Blood moves with greater Velocity through the Lungs, than through any other Part of the Body: what are we to conclude from this,

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but that the Blood-Veſſels of the Lungs are larger, allowing the Blood to paſs through them with greater Freedom? Which being once admitted, Dr. *Boerhaave's* Theory is directly overthrown, in the very Inſtance that Dr. *Haller* refers to in Support of it (Vol. II. p. 230.) and ſtill more clearly with reſpect to larger Animals, where the Force impelling the Blood into the Lungs is with good Reaſon ſuppoſed to be leſs than that which throws it into the Aorta.

FINIS.